

1106 Louisiana St.  
Silver City, N. M.  
November 12, 1950

Valencita,  
N. M.

Mr. Fred Searls, Jr.  
Room 1501  
14 Wall Street  
New York 5, N. Y.

Dear Mr. Searls:

Re: Additional Information  
on the Uranium Deposits  
Near Grants, New Mexico,

During the investigation of the uranium deposits the question was raised as to age and identification of the formations. Dr. Clay Smith of the New Mexico School of Mines is considered the authority on the stratigraphy of this area so on my return to Silver City I stopped in and talked to him.

According to him, the uranium bearing limestone is the Todilto formation of Middle Jurassic age. It is overlain by 500 to 600 feet of the Morrison formation which is in turn capped by a thin thickness of the Abitoa. The red, cross-bedded sandstone immediately beneath the limestone is the Entrada sandstone of the Middle Jurassic. He also stated that the limestone pinched out a few miles north and south of the uranium deposits. Mr. Murphy, Mr. Kirchman, and I made a trip through the country in Township 11 and 12 North and Range 15 and 16 West. In this country there are some high variegated red and white cliffs which Smith said was an unbroken sequence of Middle Jurassic sediments and that the Todilto limestone is missing.

He reported that he had formerly worked for the V.G.A. and had examined these deposits three years ago. He turned them down at that time for the same reasons that Murphy disapproved of them. He believes that the uranium originated in the Ferron formation and was leached out and concentrated in the Todilto.

The Union Assay Office did not run a quantitative analysis on my samples but sent them to the Bureau of Mines for an inadequate radiometric determination. I do not feel that the results will be any assistance but since the deposits are not considered favorable and the cost of a quantitative

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analysis is high I have not asked the samples to be assayed again. The data on the samples is tabulated on the attached sheet.

Upon his return to Silver City, Mr. Kirchman turned over to the local Bureau of Mines' office several samples of the uranium ore. These were picked samples and cannot be considered as a representation of the average grade of the deposit. Three of the samples were run quantitatively for uranium. The Bureau by the way determined that the mineral was carnotite rather than tyuyamnite as I had thought. The results of the three samples are as follows:

Chemical Analysis	Radioisotopic Analysis
1.29% U <sub>3</sub> O <sub>8</sub>	1.27% U <sub>3</sub> O <sub>8</sub>
1.26%	1.25%
0.15% "	0.15% "

Kirchman did not keep a record of the location of the samples so we have no way of knowing which part of the outcrop they represent.

Sincerely yours,

R. D. K.

Richard D. Kilett

cc - A. Brant

**SAMPLING OF THE PODINTO URANIUM DEPOSITS  
NEAR GRANTS, N. M.**

<u>Sample No.</u>	<u>Location</u>	<u>Description</u>	<u>Results</u>
S-1	Sec. 19, T12N, R9W	Taken in a 6 inch bed of finely crystalline limestone occurring on the flank of a "roll". Taken as a representation of best ore in area.	Moderately Strong Radio-activity
S-2	Sec. 19, T12N, R9W about 1000 feet northwest of S-1	Cut vertically down a $\frac{1}{2}$ foot exposure of fine strong crystalline limestone and argillaceous limestone. The Geiger gave a very high reaction over this exposure.	Moderately Strong
S-3	In the Minrock Claim, Sec. 25, T13N, R10W	Taken at random over an outcrop of dense, grey limestone containing streaks of carnotite. This outcrop having an apparent thickness of 10 feet is on the edge of a "roll" 100 feet long and 50 feet wide.	Weakly Radio-Active
S-4	From the Summit Claim, Sec. 20, T13N, R12W	Sample taken vertically down a 15 foot exposure of grey crystalline limestone containing good showings of carnotite.	Moderately Strong
S-5	Taken from the Alfred button claim, Sec. 19, T 13 N, R 10 W	Cut from a thin bed of limestone which showed no mineralization but gave a slight reaction to the Geiger Counter	Not Radio-Active
S-6	From same property as S-5 but about 1500 feet to the north	Taken at random over an outcrop showing good ore.	Trace radio-activity

Albuquerque, New Mexico  
October 9, 1950

Mr. Fred Searls, Jr.  
Room 1501  
14 Wall Street  
New York 5, N. Y.

Re: A Recent Carnotite Strike  
Near Grants, N. M.

Dear Mr. Searls:

#### INTRODUCTION

Mr. Kirchman and I have been fortunate enough to get in on what appears to be the start of a new and very probably an important strike of carnotite.

I feel that this discovery of carnotite is of sufficient importance to bring to your attention immediately. Since it has no apparent relationship to the copper-bearing sediments of the Copperton District I will not attempt to make this my final report on the entire district, but will confine this to the carnotite deposits and write my final report when I return to Silver City where conditions are a little more favorable for writing.

#### LOCATION

The carnotite is located in a thin-bedded limestone of Jurassic (?) age which strikes about N 45° W from Mount Taylor across the country for a reported distance of at least 40 miles. Mr. Kirchman and I, accompanied by some of

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the original locators, followed the member and the ore for at least 10 air miles and about 25 ground miles along its strike.

Within this distance we encountered excellent to fair showings of carnotite about every  $\frac{1}{4}$  of a mile. It is reported that the outcrops continue on to the north as far as the limestone is exposed.

#### HISTORY

The history of these deposits is very short. Last Fall a Navajo Indian, Mr. Pat Martinez, made the first discovery of carnotite on his homestead near the northern portion of the area. He kept it quiet for some time but it finally leaked out to the local people about Grants and the adjoining communities. This summer these folks have been locating claims as fast as their work would allow them. All most all of these claims have been located by visual inspection of the ground and to the best of my knowledge there has been very little work done on these deposits with a Geiger Counter.

Mr. Jones, one of the owners in the area, told us that there are approximately 30 claims, divided one way or the other between 11 owners. Mr. Andrews, another owner, told Kiroman and I that the mineral rights of some of the ground is reserved by the railroads and homesteads but that there still remains large tracts which are still open for location.

## GEOLOGY

The ore horizon is a thin-bedded limestone overlain by a thickness of 500 to 600 feet of white sandstone and shales of Jurassic (?) age and underlain by red, cross-bedded sandstone of Triassic (?) age. There is no apparent unconformity between the beds as the limestone grades through a thin thickness of shaly limestone into the underlying Red Beds. The upper contact was not examined very closely and it is generally covered with soil and talus but I believe it to be conformable.

Regionally, the structure of the area is a large dome which has been subjected to a long period of erosion. The central portion of the dome is the pre-Cambrian granite of the Zuni Mountains around which the sediments have been eroded into concentric rings of escarpments and mesas.

The ore bearing limestone, which has resisted erosion better than the overlying and underlying sandstones, forms the capping dipping to the east to the Morrison formation and limited on the west by the escarpment of the Red Beds. The mesa has a dip slope of about  $7^{\circ}$  to the east and is covered with sandy soil except for a narrow zone along the

1. The thick, massive sandstone immediately above the limestone is probably the Morrison formation and the sandstone below appears to be the "Red Beds"; however, I did not attempt to work out the stratigraphy and these correlations may be wrong.

edge of the westward facing escarpment. The limestone capping where it is visible above the Red Beds has an average thickness of about 10 feet, although in places due to weathering it is only 2-3 feet thick. In one locality a measured thickness of the limestone was 15 feet and it is felt that this thickness will be the maximum that can be expected down dip to the east where the soil cover has protected the capping from erosion.

The soil varies in thickness over the extent of the mesa. While I can only guess at its depth I would judge that it could attain a depth of 20 feet adjacent to the Morrison formation.

The width of the mesa from its western to its eastern limit varies according to the number of arroyos which have eroded headward into it. Its width will be as great as 1½ miles and as small as ¼ mile, but an average width of a mile probably can be counted on.

#### Ore Deposits:

The ore mineral is carnotite which in places occurs in sufficient amounts to color the rock a bright canary yellow. Minor quantities of a yellow-green mineral is also present. This may be tyuyamunite or discolored carnotite. The minerals coat the joint and bedding planes of the limestone and locally are disseminated through the rock.

The best ore is found within a structure called a "roll" by the local prospectors. These rolls are a true deformation of the limestone bedding and are not the same type of structure which is called a roll in the Colorado Plateau region.

There a roll, as I understand it, is where the ore cuts across the bedding of the sediments with no apparent deformation of the sediments. Here within the Grants deposits the limestone contains small open anticlines and synclines which have not been transmitted into the underlying or overlying sandstones. These structures appear to strike in all directions and to have no apparent pattern. It is along the flanks and crests of these small folds that the best ore is found, although it was also observed in places where the bedding was not disturbed. I can not give a satisfactory explanation for these structures but I suspect that they may be due to compaction.

Since, due to the soil cover, it is only possible to prospect with a Geiger or by eye along the western escarpment it is a little difficult to determine the distribution of the ore. As previously mentioned outcrops of the mineral can be seen about every  $\frac{1}{4}$  of a mile along the rim of the mesa; however, in trying to determine the limits of the individual ore shoots it becomes apparent that they are of relative small size; i.e., they will be from 2 to 15 feet wide and 20 to 200 feet long. The largest deposit known to me is owned by Mr. Andrews. It is 50 feet wide and about 300 feet long. While it is entirely possible that the soil cover interferes with the reception of the Geiger I believe that many of the outcrops we examined did not have a sufficient cover over them to greatly retard the radiations from the carnotite. Therefore, I feel rather certain that the mineral will occur as small isolated ore shoots of hundreds or thousands of tons in volume.

I cut a few samples of the ore and have sent them to the Union Assay Office in Salt Lake for analysis ( Kirchman and I felt that it would be best not to bring too much attention to these deposits by having them done locally). The only information that I have regarding the grade of the ore is what Mr. Andrews told me. He has had three samples ran and their values were about 0.56% U<sub>3</sub>O<sub>8</sub> for two of them and 1.10% U<sub>3</sub>O<sub>8</sub> for the other. He had a Dectectrox Geiger Counter which had a dial calibrated in percentages. I borrowed it for a few minutes and ran over his largest deposit. It registered 1.50%.

#### REACTION WITH THE GEIGER COUNTER

There is little report concerning its reaction except to say that the count was so high and so rapid that it was impossible to keep a record of it.

The Red Beds were checked in several places but did not give any increase in the background count. The Morrison formation was checked in one spot with unfavorable results.

#### ACTIVITY IN THE AREA

The strike has been kept so quiet by the local prospectors that thus far no company has made an examination of the deposits. The prospectors have confined their work to the limestone member and the known outcrops of ore, leaving the great thickness of sediments above and below the limestone unexplored. Their work has to date consisted only of locating claims and they have not made any attempt to open up the deposits. I was told by Jones and Andrews that there does not exist

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a single cut in the entire length of 40 miles along the known extension of the ore.

One engineer has seen a portion of the deposits and it was reported to me that he is returning for another look. He is Mr. G. R. Griswold, Agent for Mineral Rights, of the Ortiz Mine Grant. His address is 1500 Las Lomas Road, Albuquerque, New Mexico.

#### CONCLUSIONS

1. The carnotite is localized in small, isolated bodies within a thin limestone member. While each individual ore shoot is relatively small there is a large number of the deposits distributed along the strike of the limestone for a known distance of 10 miles and a reported distance of 40 miles. Consideration of this distribution with the probable extension of the ore to the east, down the dip of the limestone, suggests the possibility of several millions of tons of carnotite available for milling.
2. Since the ore-bearing limestone forms the capping of a wide mesa the ore bodies will be within the scope of open pit mining. The cover over the ore is a sandy, unconsolidated soil which probably will not exceed 20 feet in depth.
3. Exploration should be done along the top of the limestone mesa to the east and away from the mesa rim. I feel certain that other ore bodies will be found there. The sediments above and below the limestone offer limited possibilities of other ore bodies but I feel that more exploration should be done.

within them to eliminate these possibilities.

4. Due to the scattered, relatively small ore shoots it may be more profitable for these deposits to be worked by lessees rather than by the personnel of a large company. Therefore, I believe that the erection of a custom mill about Grants could possibly stand some consideration.

I am leaving immediately for Red River and may be reached there in care of General Delivery or Mrs. L.M. Smith.

Sincerely yours

RDC

Richard D. Elliott

cc: A. Brant

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1106 Louisiana St.  
Silver City, N. M.  
November 11, 1950

Mr. Fred Searis, Jr.  
Room 1501  
14 Wall Street  
New York 5, N. Y.

Dear Mr. Searis:

Re: Reconnaissance of Cuperiferous  
"Red Beds" in the Zuni Mount-  
ains of Valencia County, N. M.

#### INTRODUCTION

A total of ten days from September 27th to October 5th was spent in the field examining the copper deposits in the "Red Beds" and pre-Cambrian rocks of the Zuni Mountains. Mr. H. I. Kirchman accompanied me on this examination.

While returning to Silver City I stopped off at Socorro and saw Dr. Clay Smith of the New Mexico School of Mines. Since he has spent the past three summers in and about this country, I thought he might know of some additional information on the area. However, he was primarily interested in the stratigraphy of the country and could give me very little information concerning the mineralization of the Zuni uplift.

#### GENERAL GEOLOGY

The Zuni mountains lie in the northwestern corner of Valencia County about 16 miles by road west of Grants, N. M. The topography is mountainous but not exceptionally rugged. The ridges and peaks are rounded and the slopes relatively gentle. The highest peak in the area is Mount Sedgwick which attains an elevation of 9,200'; the mean elevation is a little over 8,000'.

In the winters there is about 2 or 3 feet of snow. This precipitation along with the summer rains support a rather heavy growth of pine, fir, and aspen over the mountainous region. While I only saw three small streams, sufficient water for mining and milling could probably be secured from shallow wells.

The mountain range is a long narrow unconformable trending across the country about N 30° E for a distance of 12 miles. The core of the structure is a complex of schists, gneisses, and granites of pre-Cambrian age. Surrounding the older rocks are outward dipping Paleozoic and Mesozoic sediments of conglomerate, sandstone, shale, and limestone.

Structurally the area is not very complex. To the north and east of the mineralized areas some faults exist which will complicate the geology, but since these faults were some distance removed from the areas in which we were interested, I did not attempt to study them.

The copper mineralization is confined to shear zones within the pre-Cambrian rocks and to the lower portion of the Diener Formation (Pennsylvanian?), just above the granite. The first type of mineralization is believed to be due to supergene enrichment derived from rather thinly scattered primary copper minerals. The origin of the copper in the Diener formation is doubtful since there is conflicting evidence indicating that it may be syngenetic or supergene in origin.

#### Copper Deposits in the Pre-Cambrian Rocks

Mr. Kirchman and I spent four days in an unsuccessful attempt to locate the Compromise Vein and the town of Copperton. We made inquiries of the "old timers" about Grants, the Forest Service, and Mr. Clay Smith but none of them know the location of the vein nor the town. We did manage to locate from maps the valley in which Copperton is supposed to have been situated but we could not find anything that resembled Schrader's description of the Compromise Vein.

I have been forced to the conclusion that if the Compromise Vein exists, it is not as extensive as Schrader indicates and there is little likelihood that it is of sufficient size for a stripping operation.

#### Diener Mine

This mine, formerly the Mathews-Whiteside mine,<sup>2</sup> is located on the east side of Diener Canyon in section 17, T 11 N, R 12 W. It is reached by taking the Zuni Canyon road out of Grants and turning to the right a mile west of the Malpais Spring road. The nearest shipping point from the mine is Grants, a distance of 24.8 miles.

On the property are three old cabins and the foundation of an old mill. The mill formerly belonged to the

1. U.S.G.S. Prof. paper 68, p. 135.

2. Ibid, p. 139.

Whitesides but it burned down a number of years ago. From what remains, it appears that it did not exceed a capacity of 50 to 75 tons.

The mine is situated about 100 feet up the slope from the mill site. It consists of two shafts, one filled with water and the other caved. The caved shaft is reported to be 385 feet deep. These workings have been put down in a shear zone striking N.  $70^{\circ}$  E through a fine-grained gneissoid granite. At the mine the shear zone contains malachite, chrysocolla, and a little aurite covering the fracture planes. No evidence of pre-existing sulphide mineralization was recognizable under a 10X hand lens. About 150 feet eastward and up the slope a small cut has exposed a little copper oxide and some casts of pyrite. It appears that the original sulphides content may have been about 1.50%.

The mineralization is localized within a small pod within the shear zone. While a very small amount of oxide ore can be found up the slope from the mine the best ore is at the workings where it is confined to a width of about 50 feet and a length of 135 feet. Sample #1 was taken in the best appearing ore within the shear zone. It assayed 1.10% copper.

The shear zone was traced for two miles to the west and three miles to the east of the mine but no additional copper mineralization was observed. Along its extent the country rock varies from a fine-grained granite to a coarse gneiss. Accompanying it is a 1 to 6 foot barren, white quartz vein that appears to cut across the zone from one side to the other. In many places the vein is partially or wholly covered and it is not always possible to determine its relationship to the structure.

#### Manganese Deposit in the Granite

In section 35, T 11 N., R 12 W., about  $\frac{1}{2}$  mile off the Sinner road a 20 foot shaft has exposed a 4 foot vein of pyrolusite and malonelane. The vein, situated in badly decomposed granite, is vertical and strikes N.  $7^{\circ}$  E. It has very little extent as neither the vein nor float can be traced away from the shaft for a distance of more than 100 feet. About 150 feet north of the shaft a small gully has exposed a 6 foot vein of barren quartz. This quartz vein has the same attitude as the manganese and is probably a continuation of the same structure.

Sample #2 was taken in the dump by the shaft and consisted of manganese oxide and decomposed granite. It ran 1.30% copper and 12.25% manganese.

About 300 feet south of the shaft a small cut has exposed a little chrysocolla. The mineral occurs as a thin film coating the fracture planes of a narrow shear zone in a chlorite schist. A few thinly scattered limonite stains are the only evidence of pre-existing sulphide mineralization. The mineralization is very weak and localized. The exposure can hardly be considered more than a slight showing.

#### Fluorite Deposits Within the Granite

These deposits are located in section 7, T 11 N, R 12 W about  $\frac{1}{2}$  mile east of Red Bed copper deposits. The deposits were not examined very closely. The dumps were looked at and they contained some fair fluorite, generally green or purple in color. Associated with the material and apparently lying between the fluorite vein and the wall rock, is a small amount of cuboidal barite. From what I saw of the deposit I received the impression that the vein contained fragments of the country rock and would have a maximum width of about 3 feet. I did not attempt to follow the vein to its furthest extension but if it behaves like the copper deposits within the granite it will probably have a total length of a few hundred feet.

A copy of a report on the property by Mr. T. D. Ben-Javak is enclosed.

#### Copper Deposits Within the Red Beds

These deposits are located in the Copper Hill district<sup>3</sup> in section 6, T 11 N, R 12 W about  $\frac{1}{2}$  mile west of the fluorite prospect. The property consisting of 11 unpatented claims is owned by Mr. Maizes Hirabal of Grants, New Mexico. It has been developed by a few shallow cuts and adits with a total production, according to Hirabal, of 600 tons of hand-picked ore averaging about 14.00% copper.

The ore is confined to the lower 20 feet of the Diener formation. This formation is a red arkosic conglomerate

3. Ibid., p. 139.

with a maximum thickness of about 50 feet. It lies directly above and is derived from the granite. The member is crudely cross-bedded and composed of about equal amounts of feldspar and quartz with large quartz pebbles scattered throughout it. In places the quartz pebbles are missing and the rock then resembles a coarse-grained sandstone. At the Mirabal property the conglomerate forms a dip slope of about  $10^{\circ}$  to the north. The slope continues from the granite-Diener contact northward for about 1 mile, thickening down dip until it disappears beneath a dark red sandstone just south of the Bluestone Canyon. Nowhere within the Bluestone Canyon was the conglomerate exposed. The Diener formation on the Mirabal claim differs in two respects from the same formation found elsewhere about the periphery of the pre-Cambrian mass; namely, (1) the occurrence of the copper oxide ores, and (2) the thin lenses of shale in the lower 20 feet of the member. It is noteworthy that where the shale is absent there are no copper minerals.

The shale is soft, fissile, and a greenish-gray in color. In spots it has a reddish tint due to the presence of hematite. Its thickness as well as its stratigraphic position will vary within the Diener formation. At the northern end of the property in the Tunnel Pit, a lens of shale has been exposed lying within the conglomerate. The lens is about 7 feet thick and 450 feet wide and is overlain and underlain by about 6 feet of conglomerate. The length of the lens down dip is unknown but it cannot be great as there are only 2 feet of shale in the Shanty Cut and two 1 foot beds in the Bluebell Cut. In the Bluebell and Pit No. 1 the shale thickens and thins; splits around small lenses of sandstone; and in every respect, indicates a crude sort of cross-bedding. The irregularity of the shale members is further emphasized by their vertical distribution within the Diener conglomerate. At the Tunnel Pit 6 feet of conglomerate lies between the shale and the granite; at the Shanty Pit there is 10 feet; at the Bluebell Pit, 12 feet; Pit No. 3 there is 5 feet; and, Pit No. 1 about 15 feet.

To the west of Copper Gulch and the east of Diener Canyon the conglomerate is present but the shale is absent. The Diener formation was studied in several scattered localities about the uplift but in none of them was the shale or copper present. It appears that from its relationship to the conglomerate and its localization at Copper Hill, the shale is the result of separation from small, quiet bodies of water such as backwaters or puddles resulting from a local flooding of the Copper Hill district during Pennsylvanian

time. There is little promise of the shale continuing over any large area. Neither Mr. Mirabel nor Dr. Clay Smith know of any other copperiferous sediments outside of the Copper Hill district.

The copper ore is entirely the oxides of copper, principally malachite, chrysocolla and minor amounts of azurite. The distribution of the ore is peculiar. Above it there always exists 2 to 5 feet of barren conglomerate. The copper minerals generally are found coating small joints and are thinly disseminated through the conglomerate a few inches above the highest shale horizon. The shale is partially replaced by the copper but the major concentration of the minerals is along the bedding planes. The thin conglomerate or sandstone beds between the shale lenses contain considerable disseminated copper, apparently replacing the kaolin; however, at each shale horizon there is a stronger concentration of the minerals. It is noteworthy that along the Diorite-granite contact where erosion has removed the shale but has left 4 to 6 feet of the harder conglomerate no copper minerals were present. Yet, in the Bluebell Cut and in Pit No. 6 the workings have exposed the lower conglomerate, only a short distance from the contact, and it contains chrysocolla, malachite, and azurite. In Pit No. 4 a shaft was collared in the conglomerate, passed through a 2 foot bed of shale, and entered the granite. In this exposure a small amount of chrysocolla had migrated down into the granite where it was deposited along small joints and fractures. The Tunnel Pit has exposed a lens of shale 7 feet thick and about 450 feet wide which contains a few petrified logs. The shale is barren except for some finely disseminated malachite along a few of the bedding planes. The logs have been replaced by silicon and malachite. Mr. Mirabel has an ore pile of these logs and they look as if they would run quite high in copper, but there are only a few of them in the formation and taken as a whole the formation would be very low in value.

Although iron oxide is scarce throughout the area and the presence of pyrite or chalcopyrite casts is doubtful, there is evidence of hypogene mineralization later than the Diorite formation. In the Bluebell Cut a nodule about 4 inches across was dug out of the shale. This nodule was composed of dark red hematite surrounded by fine malachite crystals. A vug within the center of the nodule contained small euhedral crystals of barite. This nodule is the only sample from the district that showed a trace of radioactivity upon analysis. On the dumps of Pits Nos. 4 and 6 some fragments of the conglomerate contained small stringers of barite and fluorite.

I could not find any residual sulphides along these stringers, nor was any observed in the fluorite prospect to the east of Connor Hill. In several of the pits thinly disseminated specks of iron oxide can be found in the conglomerate but are too small to be determined with a 10X hand lens as residual or transported. In Pit No. 6 some of the specks are surrounded by chrysocolla.

It is believed that the oxides have migrated downward from thinly disseminated synkinetic copper sulphides and salts and have been concentrated within and adjacent to the shale members. The original source of the copper was probably the nearby shear zones within the granite. It is felt that the shale is a prerequisite to any worthwhile concentration of the copper ore and that where the shale is absent, the copper was not fixed but was carried off by the ground water. Two factors could have contributed to the concentration of the copper in the shale beds; i.e., the relative impermeability of the shale, and the possible higher content of a carbonate radical than exists within the conglomerate.

The possibility that the ore is due to the oxidation of pre-existing chalcocite cannot be passed over, however, it should be emphasized that no residual chalcocite was observed. Evidence indicating the former presence of this primary copper mineral is (1) the occurrence of barite within the nodule from the Russell Cut, (2) the stringers of barite and fluorite, and (3) the scarcity of iron oxide.

#### Reactions with The Geiger Counter

Due to our inexperience with a Geiger Counter, Mr. Hirshman and I spent a great deal of unnecessary time trying to determine if this area was radioactive. I explained our results to Mr. Richard Murphy and took him out to the property where he eliminated it in short order. The results of our samples certainly prove that his conclusions were correct.

Mr. Hirshman and I found that where the shale was exposed we would receive from 2 to 4 times the background count of the counter, and that the higher readings were where the copper was most abundant. Above the pits and on top of 2 or 3 feet of the conglomerate capping there was very little increase in the background count. The conglomerate and sandstone gave no increase except where it contained copper.

A total of 5 samples for copper and radioactive minerals respectively was cut in the area. These have been tabulated on the attached sheet.

#### CONCLUSIONS

1. The deposits within the pre-Cambrian granite are very small and hold no promise of any large tonnage. The largest deposit seen was 135 feet long and 50 feet wide and would not increase in size with depth.
2. Due to localization of the copper ore within and adjacent to the small, irregular shale lenses, the shallow zone of mineralization, and the 2 to 6 foot of barren capping, I am of the opinion that these deposits are not of sufficient value to mine. As the distribution of the ore is so spotty, it is difficult to make an accurate estimate of the tonnage which would be available for striping but I believe that under the most favorable conditions it will not exceed two million tons of possibly 2.00% ore. To secure this tonnage a minimum of two million tons of barren capping would have to be removed.
3. There is not sufficient outcrops within these deposits to make a geophysical examination of the district practical.

Very truly yours,

*R.D.E.*

Richard D. Elliott

cc - A. Brant  
Enclosures

SAMPLES FROM THE COPPER HILL DISTRICT, N. M.

<u>Sample No.</u>	<u>Location</u>	<u>Description</u>	<u>Percentage</u>
C-1	Pit No.1	Taken vertically through two feet of copperiferous shale and sandstone.	1.27% Cu.
C-2	Pit No.4	Consisted of best appearing ore on the dump.	0.12% Cu.
C-3	Pit No.6	Taken at random over dump.	1.10% Cu.
C-4	Pit No.3	Taken vertically across a 4 foot bed of shale.	0.05% Cu.
C-5	Bluebell Cut	Taken in face of the cut vertically through 4 feet of copperiferous shale and conglomerate.	2.42% Cu.
C-6	Shanty Cut	Taken vertically through a two foot bed of copperiferous shale.	4.95% Cu.
C-7	Tunnel Cut	Cut vertically through 1½ feet of shale in the face of the small adit.	0.87% Cu.
C-8	Pit No.10	Consisted of best appearing ore on the dump.	5.50% Cu.

Note: Eight samples, U-1 to U-8, were cut in the same locations as the copper samples with corresponding numbers. These samples were submitted for uranium determination. The results were "not radio-active" except for Sample U-5. This sample from the Bluebell Cut consisted primarily of fragments of the nodule mentioned in the report. It was classified as "weakly radio-active".

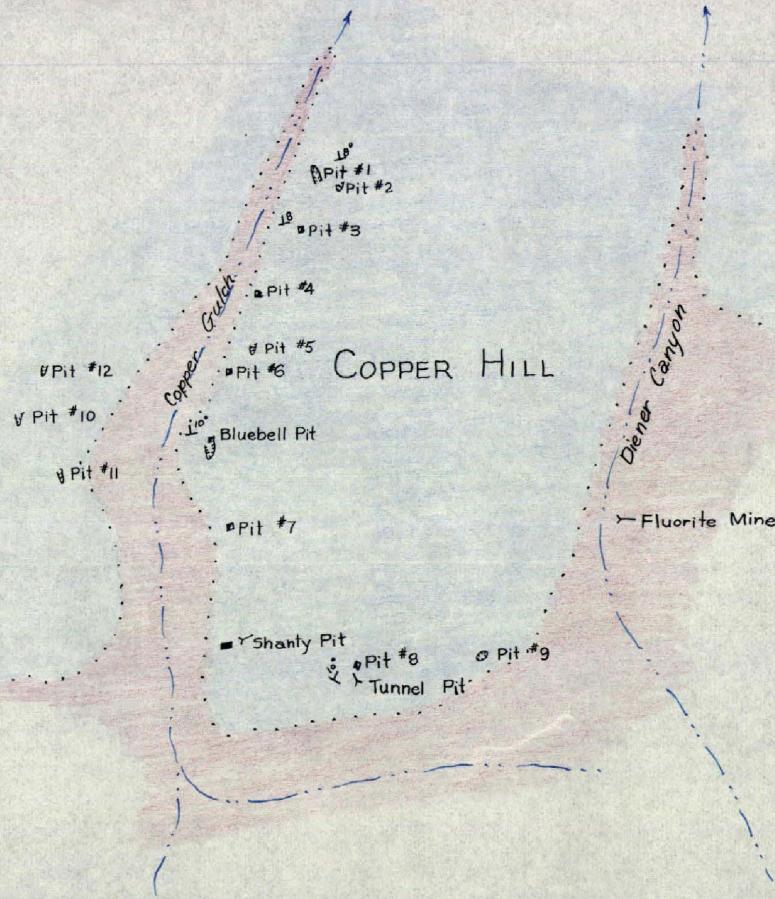
GEOLOGIC MAP

of the

Copper Hill District, N.M.

Scale 1" = 50'

Diener fm., Pennsylvanian (?)  
Pre-Cambrian Granite



Newmont-Haystack 104(e) Response  
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